B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch—Common to all Branches

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS

[AI, AN, AU, CE, CS, EC, EE, EI, IC, IT, ME, PE and PO]

(New Scheme—Regular/Improvement/ Supplementary)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. What are the functions of stock markets ?

2. Mention any *six* MNC's working in India.

3. What do you mean by progressive and regressive taxes ?

4. What are the difficulties in estimating national income ?

5. What do you mean by BOP ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain the credit control system of RBI.

7. Comment on LPG (Liberalisation, Privatisation and Globalisation).

8. What are the major functions of taxation system ?

9. Explain the major causes of inflation in a country.

10. Comment on the impact of WTO decisions on Indian industries.

(5 × 5 = 25 marks)

Part C

*Answer any one **full** question.*
Each question carries 12 marks.

11. Explain the role of National banks for the agriculture and rural development.

Or

12. Banker's bank of India is RBI. Explain.

Turn over

13. Comment on the effects of MNC's in growth of India.

Or

14. The growth of IT industry is essential for India. Explain the reasons.

15. The major source of a nation is taxation system. Give reasons.

Or

16. Write notes on (a) Direct and indirect taxes ; (b) Tax evasion ; and (c) Deficit financing.

17. Explain the methods of estimating National Income.

Or

18. What are the measures of controlling inflations ? Explain.

19. Explain the causes of disequilibrium in India's Balance of payments (BOP).

Or

20. Comment on the effects TRIPS and TRIMS in the Indian economy.

(5 × 12 = 60 marks)

F 2975   (Pages : 2)   Reg. No..................................

                                                            Name...................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 303/IT 010 306—PROBLEM SOLVING AND COMPUTER PROGRAMMING
(C.S. and I.T.)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define 'Macros'.

2. What are the different control statements in C ?

3. Explain freed ( ).

4. What are the basic data types in C ?

5. What is a 'Keyword' ?   (5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain the structure of a C program.

7. Define function. What is a void function ?

8. What is a multi-dimensional array ? Explain how the elements of a multi-dimensional array are accessed.

9. Compare 'structure' and 'union'.

10. Illustrate the bitwise operators and their usage.   (5 × 5 = 25 marks)

Part C

Answer **either** (*a*) **or** (*b*) *from each question.*
Each full question carries 12 *marks.*

11. (a) Write an algorithm and a flowchart to select the largest number from a set of 50 numbers.

                                                            (12 marks)

Or

(b) Write a C program to evaluate $1+\dfrac{1}{2}+\dfrac{1}{3}+......+\dfrac{1}{n}$.

                                                            (12 marks)

Turn over

12. (a) Write a C program to add two $m \times n$ matrices.   (12 marks)

Or

(b) Explain the different control statements in C with suitable examples.   (12 marks)

13. (a) Write a C program to display a string in reverse order.   (12 marks)

Or

(b) Write the differences between macro and function. Write a C program to find the factorial of a number using function.

(12 marks)

14. (a) Write a C program to read in the marks of 5 subjects of 5 students and display the result with standard rules for result.

(12 marks)

Or

(b) Using pointers, write a C program to ree in an array of 50 numbers and print its elements in reverse order.

(12 marks)

15. (a) Write a C program to illustrate appending items to an existing file.   (12 marks)

Or

(b) Explain Dynamic memory allocation in detail. Explain the different library routines which serve as memory management functions.

(12 marks)

[5 × 12 = 60 marks]

F 2982   (Pages : 2)   Reg. No...............................

Name...................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science

CS 010 304—COMPUTER ORGANISATION (CS)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours   Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 marks.

1. What are the basic arithmetic operations performed in ALU of a basic processor ?

2. What are the advantages of using a floating point representation ?

3. What is a vertical microinstruction ?

4. What is a scratch pad memory ?

5. Write the functions of a page table.

(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. What are the different ways of representing signed numbers ?

7. Describe how multiplication and division takes place in a floating point number.

8. What are the advantages of having horizontal instruction format ?

9. What is the need for having the hierarchy of memory devices ?

10. What is the need for dynamic relocation techniques in memory ?

(5 × 5 = 25 marks)

Part C

Answer **either** *(a)* **or** *(b) section from each module.*
Each full question carries 12 marks.

11. (a) Explain the different methods by which addition and subtraction takes place in a signed number system.

Or

(b) Write a short note on Booth's algorithm.

Turn over

12. (a) How are the different arithmetic operations performed in decimal number system in a processor?

Or

(b) Explain the different steps to be taken care of while designing an ALU.

13. (a) With a block diagram, explain the organization of a control unit.

Or

(b) When do we prefer microprogrammed control unit and why?

14. (a) Compare and contrast different types of associative memories.

Or

(b) Write notes on RAMs.

15. (a) How is paging different from segmentation in memories?

Or

(b) With a neat diagram, explain the need and the process by which the physical address changes to logical address and vice-versa.

(5 × 12 = 60 marks)

F 2992

(Pages : 2)

Reg. No......................................

Name......................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 305 ⎫
IT 010 304 ⎬ SWITCHING THEORY AND LOGIC DESIGN (CS, IT)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

*Answer **all** questions.*

Part A

Each question carries 3 marks.

1. State the different types of hazards.

2. What are Universal Gates ?

3. State the advantages of Parallel Adders.

4. Draw the circuit of D-Flip-Flop using NAND gates.

5. State and prove DeMorgan's Theorem.

(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. Convert the following binary numbers to its equivalent decimal numbers :

   (a) 1101.

   (b) 1011.

   (c) 0.001101.

   (d) 0.1101.

   (e) 111011.101.

7. Explain the characteristics of CMOS gates.

8. Explain Carry Look Ahead Adder.

9. What is Race Around Condition ? How is it eliminated ?

10. Explain the working of Johnson counter.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 marks.

11. (a) Design a BCD to excess 3 code converter.

(12 marks)

Or

   (b) Simplify using K map :

     (i) $A\left(A\bar{B}C + A\bar{B}\bar{C} + AB\bar{C}\right)$.

(6 marks)

     (ii) $F(w, x, y, z) = \Sigma (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$

(6 marks)

Turn over

12. (a) Explain with neat Figure (i) a Carry Save Adder ; (ii) Serial Adder.   (6 + 6 = 12 marks)

Or

(b) (i) What is PLA ? Explain.   (6 marks)

(ii) Compare PlA and PAL.   (6 marks)

13. (a) Explain in detail, with a neat figure, the working of Master Slave JK Flip-Flop. (12 marks)

Or

(b) A sequential circuit has 2 flip-flops A and B, 2 inputs x and y and an output z. The flip-flop input functions and the circuit output function are as follows :

$$J_A = xB + y'B' ; \qquad K_A = xy'B'$$

$$J_B = xA' ; \qquad K_B = xy' + A$$

$$Z = xyA + x'y'B$$

Obtain the logic diagram, state table, state diagram and state equations.

(12 marks)

14. (a) Explain the different types of Shift Register and their applications.   (12 marks)

Or

(b) Design an asynchronous binary 4-bit up counter.   (12 marks)

15. (a) Write brief notes on the following logic families :

(i) TTL.

(ii) ECL.

(6 + 6 = 12 marks)

(b) (i) Write briefly on Fault tolerance in combinational circuits.   (6 marks)

(ii) Explain the different type of hazards in detail.   (6 marks)

[5 × 12 = 60 marks]

F 3001

Reg. No...................................

Name...................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering

CS 010 306—ELECTRONICS DEVICES AND CIRCUITS (CS)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

Each question carries 3 marks.

1. What are the advantages of bridge rectifier ?
2. What are the uses of transconductance amplifier ?
3. Discuss the applicatins of OPAMP voltage follower.
4. What are the conditions for oscillation in a circuit ?
5. Explain the step response of a high-pass RC circuit.

(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. Compare the characteristics of L, C and LC filters.
7. Explain with diagrams the biasing techniques used in BJT amplifiers.
8. What are the characteristics of a conventional OPAMP ?
9. What are the different feedback systems used in BJT circuits ?
10. Explain with diagrams an application of 555 timer.

(5 × 5 = 25 marks)

Part C

Each question carries 12 marks.

11. Explain with diagrams the principle of operation of a shunt voltage regulator. What are the protection mechanisms used in that circuit ?

Or

12. Explain with a block diagram the principle of operation of a 78XX voltage regulator IC.

13. Derive a small signal model of a BJT amplifier.

Or

14. Explain with diagrams the bias point stabilization methods used in BJT circuits.

Turn over

15. Explain with diagrams the working, characteristics and applications of OPAMP difference amplifier.

Or

16. Draw and explain the functional block diagram of a commonly used OPAMP.

17. Explain with diagrams the working characteristics and uses of Wein Bridge oscillator.

Or

18. Explain with diagrams the principle of operation of crystal oscillator. What are its characteristics ?

19. Explain with diagrams the working of an astable multivibrator using OPAMP.

Or

20. Explain with a functional block diagram the principle of 555 timer.

$(5 \times 12 = 60 \text{ marks})$

F 3010

(Pages : 2)

Reg. No..............................

Name.............................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering

MICROPROCESSOR SYSTEMS (R)

(Supplementary / Mercy Chance – Old Scheme)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions briefly.
Each question carries 4 marks.

1. Explain the functions of the following pins of 8085 :

    (a) ALE ; (b) TRAP ; (c) HLDA ; (d) INTR.

2. What is PSW? Explain its functions.

3. Explain the complete actions taking place when the following are executed :

    (a) DAA ; (b) SUI 3H ; (c) LHLD ; (d) RLC.

4. Describe the implicit addressing with the help of an example.

5. Write a program to generate a delay of 1 ms. Take the clock frequency as 3 MHz.

6. What is stack and stack pointer? What are their uses?

7. Describe how interrupts are enabled, disabled and masked.

8. What are RST instructions? How these are used to call subroutines?

9. Define and distinguish between Memory mapped I/O and I/O mapped I/O.

10. Explain DMA. What are its advantages?

(10 × 4 = 40 marks)

Part B

Answer any one full question from each module.
Each full question carries 12 marks.

MODULE 1

11. (a) Clearly describe the functioning of the timing and control unit.

    (b) List all the registers in 8085, describing their functions.

Or

Turn over

12. (a) What are the flags present in 8085? Explain their functions with appropriate examples.

(b) With neat diagrams, describe how an instruction is executed?

MODULE 2

13. Discuss all the addressing modes of 8085, giving at least two examples for each type.

Or

14. (a) Explain all the branch instructions in 8085.

(b) Write single 8085 instructions to perform the following tasks :

(i) Exchange HL with the top of the stack.

(ii) Complement accumulator.

(iii) Initialise stack pointer with the contents of HL register.

(iv) Clear CY and AC flags.

MODULE 3

15. (a) Discuss the status of "status signals" and "control signals" of CPU 8085 during the following machine cycles :

(i) Opcode fetch.   (ii) I/OI write.

(b) Draw and explain the timing diagram for memory read machine cycle.

Or

16. Write a subroutine to compare numbers to find the largest and using it in a main program, select the largest of a series of numbers.

MODULE 4

17. (a) With a neat diagram, explain the interrupt structure in 8085.

(b) How SIM and RIM instructions are used for maskable interrupts? Explain by giving an example.

Or

18. (a) What are multiple interrupts? How these can be resolved using a priority encoder? Explain using an example.

(b) Explain and illustrate the ICW formats of 8259.

MODULE 5

19. (a) How block transfer DMA differs from cycle stealing DMA? Explain using flow diagram.

(b) Draw the functional block diagram of 8257 and explain its each block.

Or

20. Draw a circuit diagram to interface 8085 with an EPROM chip. Indicate the address and data line connections clearly. How the address decoder is designed?

(5 × 12 = 60 marks)

F 3036 (Pages : 2) Reg. No..............................

Name.................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering/Information Technology

HUMANITIES (R, T)

(Supplementary / Mercy Chance – Old Scheme)

Time : Three Hours   Maximum : 100 Marks

Answer Part A and Part B in **separate** *answer books.*

Parts A and B each carries 50 marks.

Part A (Principles of Management)
Answer any **one** *full question from each module.*

MODULE 1

1. (a) List the different organisational structures. Explain any *one* of them in detail.

    (b) Explain the process of delegation. What are its advantages and disadvantages?

Or

2. (a) Explain job evaluation techniques. Distinguish between job enrichment and job enlargement.

    (b) Explain the concept of controlling and co-ordinating. Distinguish between them.

MODULE 2

3. (a) Mention some of the ISO standards used for industry and write in detail about quality circles.

    (b) Explain the concept of TQM and discuss how it can improve the performance of an industry.

Or

4. (a) Define Quality. Give the axioms. Differentiate between small 'q' and big 'Q'.

    (b) Give the objectives and benefits of ISO 9000 certification.

Turn over

Part B (Engineering Economics)

Answer any one full question from each module.

MODULE 3

5. (a) What are the roles of financial institutions in India? Explain the financial institutions and their activities.

   (b) Distinguish between Debentures and Shares.

Or

6. (a) Explain the functioning of National Stock Exchange of India.

   (b) Explain the role and significance of Profitability and Liquidity principles in Commercial Banking.

MODULE 4

7. (a) Explain the Information Technology industry development in India for the last two decades.

   (b) What are the major causes and consequences of industrial sickness in India? How they can be overcome?

Or

8. (a) Explain the role of SSI in India since independence.

   (b) What are the problems of unorganised labour in Indian industries?

MODULE 5

9. (a) Give two examples of indirect taxes and with respect to them. Explain the merits and demerits of indirect taxes.

   (b) Explain impact, shifting and incidence of taxation.

Or

10. (a) Explain the major characteristics of a good tax system.

    (b) Distinguish between a progressive tax and a proportional tax. Which of the two is better and why?

F 3044

(Pages : 2)

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Name............................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering

LOGIC SYSTEM DESIGN (R)

(Supplementary / Mercy Chance – Old Scheme)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions briefly.
Each question carries 4 marks.

1. What are ASCII and EBDIC codes? Where are they used?

2. Give the binary, BCD, Excess-3 and gray code representation of the decimal number 29.

3. Obtain the canonical SOP corresponding to $f(a, b, c) = a + \overline{a}b + \overline{b}c$.

4. What is the meaning of "don't care condition" and how it is helpful in minimizing logic expressions?

5. Explain the function of a D flip-flop using a suitable diagram and describe how it works as a latch.

6. A decade counter does not use its maximum possible modulus and so there are several invalid states. List the states.

7. Explain the working of a serial adder with necessary diagrams.

8. Compare and contrast serial and parallel address.

9. Data 0101 is entered into a 4 bit serial in parallel out shift register. Draw a timing diagram to show the states of registers after 1, 2, 3, 4 clock pulses.

10. Draw the timing diagram and function table of a 4 bit Johnson counter.

(10 × 4 = 40 marks)

Part B

Answer any one full question from each module.
Each full question carries 12 marks.

MODULE 1

11. (a) Explain the features of error detecting and error correcting codes, with suitable examples.

    (b) Express the decimals 0 to 15 in binary, gray code and excess-3 code.

Or

Turn over

12. (a) Convert decimal numbers 82 and 28 into BCD and subtract them. Convert the resultant into a decimal and verify the result.

 (b) Give a scheme to detect one error and correct one error in binary number manipulation.

MODULE 2

13. Simplify the Boolean expression $f = \Sigma$ (0, 3, 4, 7, 9, 12, 13) in the SOP and POS forms using (i) K-map ; and (ii) Quine-McClusky's method. What are the number of gates used in each case? When the SOP form is preferred to the POS form?

Or

14. (a) For the Boolean expression $y = \overline{((A+B)C)D}$, give the circuit using (i) NAND only (ii) NOR only.

 (b) Simplify $F = \pi M$ (0, 3, 4, 6, 8, 15) using K-map method and draw the minimal logic circuit.

MODULE 3

15. (a) What is the need for sequential circuits? Draw and explain a Master slave JK flip-flop highlighting its merits.

 (b) A ripple counter has 4 flip-flops. The initial three states are to be skipped. Find the modulus and draw its output timing diagram.

Or

16. Design a counter using JK flip-flops that goes through the following binary repeated sequence : 0, 1, 3, 7, 6, 4. Show that when the binary states 010 and 101 are considered as don't care conditions, the counter may not operate properly. Find a way to correct the design. Draw the circuit diagram.

MODULE 4

17. What is a carry propagation adder? With a neat circuit diagram, explain the 4-bit addition using carry propagation principle. Describe its merits and demerits.

Or

18. What is a full subtractor? Starting from its truth table, design a full subtractor using basic logic gates and give its significance.

MODULE 5

19. What are the differences between serial and parallel transfer? Explain how to convert serial data to parallel and parallel data to serial. What type of register is needed? Explain with a circuit diagram for 4 bit size.

Or

20. Draw the logic diagram of a 4 bit register with four JK flip-flops to shift serial in parallel out. Explain the working with the help of timing waveforms.

(5 × 12 = 60 marks)

F 3005

(Pages : 3)

Reg. No..................................

Name......................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science / Information Technology

ENGINEERING MATHEMATICS—II (R, T)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours

Maximum : 100 Marks

Answer one full question from each module.
Each full question carries 20 marks.

Module 1

1. (a) Consider the open statement $p(x, y) : y - x^1 = y + x^2$ where the universe for x and y comprise all integers. Determine the truth value of :

    (i) $p(0, 0)$.
    (ii) $p(0, 4)$.

    (iii) $p(0, 1)$.
    (iv) $p(1, 1)$.

    (v) $\forall y\, p(0, y)$.
    (vi) $\forall x, y\, p(x, y)$.

    (vii) $\exists y\, p(1, y)$.
    (viii) $\forall y\, \exists x\, p(x, y)$.

    (ix) $\exists y\, \forall x\, p(x, y)$.
    (x) $\forall x\, \exists y\, p(x, y)$.

(10 marks)

  (b) Prove that there is no rational number p/q whose square is 2. Use the method "proof by contradiction".

(10 marks)

Or

2. (a) Define Tautology, contradiction and contingency. Explain each term with example.

(8 marks)

  (b) Show by mathematical induction :

    $2 + 4 + 6 + 8 + \ldots\ldots + 2n = n(n + 1)$.

(8 marks)

  (c) Form the disjunction of p and q for each of the following :

    (i) $p : 2$ is a positive integer $q : \sqrt{2}$ is a rational number.

    (ii) $p : 2 + 3 \neq 5\ q :$ London is the capital of France.

(4 marks)

Turn over

Module 2

3. (a) Define equivalence relation. Let S = {1, 2, 3, 4, 5} and A = S × S. Define the following relation : R on A : (a, b) R (a', b') if and only if $ab = a' b'$. Show that R is an equivalence relation.

(10 marks)

(b) State Pigeonhole principle. Show that if any 11 numbers are chosen from the set {1, 2, . . . 20} then one of them will be a multiple of another.

(10 marks)

Or

4. (a) With suitable examples, explain the following types of relations :

    (i)   symmetric.   (ii)   asymmetric.

    (iii)   transitive.   (iv)   irreflexive.

(10 marks)

(b) State and explain Euclidean algorithm. Use it to find *gcd* of 15625 and 1236. (10 marks)

Module 3

5. (a) Define Lattice. Give one example for the Lattice. Write a note on Isomorphic Lattice.

(10 marks)

(b) Let (G, ∗) and (G', ∗') be two groups and let $f : G \to G'$ be a homomorphism from G to G' then show that,

    (i)   If e is the identify in G and e' is the identify in G', then $f(e) = e'$.

    (ii)   If $a \in G$, then $f(a^{-1}) = (f(a))0^{-1}$.

    (iii)   If H is a subgroups of G, then $f(H) = \{f(h) \mid h \in H\}$.

(10 marks)

Or

6. (a) If A = {1, 2, 3, 5, 30} and R is the divisibility relation, prove that (A, R) is a lattice but not distributive.

(6 marks)

(b) Let (S, ∗) and (T, ∗') be monoids with identities e and e' respectively. Let $f : S \to T$ be an isomorphism. Then show that $f(e) = e'$.

(6 marks)

(c) Show that in a lattice if $a \leq b$ and $c \leq d$, then $a * c \leq b * d$.

(8 marks)

Module 4

7. (a) Find the discrete numeric function corresponding to the generating function $A(z) = \dfrac{(1-z)^3}{(1-z)^6}$.

(10 marks)

(b) Solve : $a_r - 9a_{r-1} + 10a_{r-2} = 3^r$, given that $a_0 = 0$ and $a_1 = 1$.

(10 marks)

Or

8. (a) Obtain the generating function for the sequence $0, 1, 2^4, 3^4, 4^4, \ldots\ldots$

(10 marks)

(b) Find a particular solution of $a_r - 2a_{r-1} = 9r$.

(10 marks)

Module 5

9. (a) Prove that if u is an odd vertex in a graph G, then there must be a path in G from u to another odd vertex v of G.

(10 marks)

(b) Prove that there is no simple graph with six vertices, one of which has degree 2, two have degree 3, three have degree 4 and the remaining vertex has degree 5.

(10 marks)

Or

10. (a) If G is a k-regular bipartite graph (K > 0) with bipartition $V = V_1 \cup V_2$ show that $|V_1| = |V_2|$.

(10 marks)

(b) Let e be an edge of the connected graph G :

    (i)   Prove that e is a bridge if and only if it is in every spanning tree of G.

    (ii)   Prove that e is a loop if and only if it is in no spanning tree of G.

(10 marks)

[5 × 20 = 100 marks]

Module 5

19. (a) Let a, b and c be three distinct vertices in a graph. There is a path between a and b and also there is a path between b and c. Prove that there is a path between a and c.

(6 marks)

(b) Prove that any two simple connected graphs with n vertices, all of degree two, are isomorphic.

(6 marks)

Or

20. (a) Show a tree in which its diameter is not equal to twice the radius. Under what condition does this inequality hold ? Elaborate.

(6 marks)

(b) Prove that a pendant edge (an edge whose one end vertex is of degree one) in a connected graph G is contained in every spanning tree of G.

(6 marks)

[5 × 12 = 60 marks]

F 2969   (Pages : 4)

Reg. No.................................

Name.................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science/Information Technology

EN 010 301 B—ENGINEERING MATHEMATICS–II (CS, IT)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions briefly.
Each question carries 3 marks.

1. Write in symbolic form :
   (a) All the world loves a lover.
   (b) It is not true that London is in India.
   (c) It is false that $7 + 6 = 13$ and $5 + 5 = 7$.

2. Differentiate between one-to-one and onto functions.

3. Define equivalence relation.

4. Let A be any subset of the real number system R with the usual order. Under what conditions is A a lattice ?

5. Draw a diagram for the graph G = G (V, E), V = {A, B, C, D}, E = [{A, B}, {D, A}, {C, A}, {C, D}].

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. State and explain duality law. Write the dual of $\neg(P \vee Q) \wedge \left(P \vee \neg\left(Q \wedge \neg S\right)\right)$.

7. The functions $f : A \rightarrow B$, $g : B \rightarrow C$ and $h : C \rightarrow D$. Prove that $h \circ (g \circ f) = (h \circ g) \circ f$.

8. Suppose R and S are transitive relations on a set A. Show that $R \cap S$ is also transitive.

9. Consider the power set P(A) of A = {a, b, c} which is a bounded lattice under the operations of intersection and union. Find the complement of X = {a, b} if it exists.

10. Draw a diagram of the following directed graph G where V(G) = {A, B, C, D, E} and E(G) = {[A, D], [B, C], [C, E], [D, B], [D, D], [D, E], [E, A]}.

(5 × 5 = 25 marks)

Turn over

Part C

Answer any **one** *full question from each module.*
Each full question carries 12 marks.

Module 1

11. (a) Find the truth tables for :

   (i) $p \wedge (q \vee r)$ and

   (ii) $(p \wedge q) \vee (p \wedge r)$.   (6 marks)

   (b) Verify that the proposition $p \vee \sim (p \wedge q)$ is a tautology.   (6 marks)

Or

12. (a) Negate the following :

   (i) $\forall x \, \exists y \, (p(x) \vee q(y))$.

   (ii) $\exists x \forall y \, (p(x, y) \to q(x, y))$.   (6 marks)

   (b) Let A = {1, 2, 3, 4} be the universal set. Determine the truth value of each statement :

   (i) $\forall x, x + 3 < 6$.

   (ii) $\exists x, x + 3 < 6$,

   (iii) $\exists x, 2x^2 + x = 15$.   (6 marks)

Module 2

13. (a) Suppose $f : A \to B$ and $g : B \to C$ are into functions. Show that $g \circ f : A \to C$ is an onto function.   (6 marks)

   (b) Solve each of the following linear congruence equations :

   (i) $3x \equiv 2 \pmod 8$.

   (ii) $6x \equiv 5 \pmod 9$.

   (iii) $4x \equiv 6 \pmod{10}$.   (6 marks)

Or

14. (a) State and explain Euclidean algorithm. Use it to find the gcd of 1052 and 356.   (6 marks)

   (b) Using Pigeonhole principle show that the decimal expansion of a rational number, must, after some point, become periodic.

                                                                 (6 marks)

Module 3

15. (a) Let A = {1, 2, 3,.......13, 14, 15}. Let R be the relation on A defined by congruence modulo 4. Find the equivalence classes determined by R.

                                                                 (6 marks)

   (b) Determine whether or not each of the following is a partition of the set N of positive integers :

   (i) [{n : b > 5}, {n : n < 5}].

   (ii) [{n : n > 5}, {0}, {1, 2, 3, 4, 5}].

   (iii) [{n : n^2 > 11}, {n : n^2 < 11}].   (6 marks)

Or

16. (a) Suppose R and S are reflexive relations on a set A. Show that $R \cap S$ is reflexive. (6 marks)

   (b) Give examples of relations R on A = {1, 2, 3} having the stated property :

   (i) R is both symmetric and antisymmetric.

   (ii) R is neither symmetric nor antisymmetric.

   (iii) R is transitive but $R \cup R'$ is not transitive.   (6 marks)

Module 4

17. (a) Let C be a collection of sets which are closed under intersection and union. Verify that $(C, \cap, U)$ is a lattice.

                                                                 (6 marks)

   (b) Consider the power set P(A) of A = {a, b, c} which is a bounded lattice under the operations of intersection and union. Find the complement of X = {a, b} if it exits.

                                                                 (6 marks)

Or

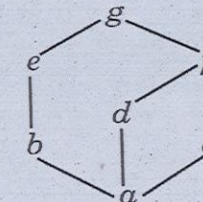18. (a) Suppose L is a bounded lattice with lower bound O and upper bound I. Show that O and I are complements of each other.

                                                                 (6 marks)

   (b) Consider the lattice M in the figure shown below :

   (i) Find the nonzero join-irreducible elements and the atoms of M.

   (ii) Is M distributive ?   (6 marks)

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B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Computer Science and Engineering/Information Technology

PROBLEM SOLVING AND COMPUTER PROGRAMMING (R, T)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours   Maximum : 100 Marks

Write neat and efficient C programs wherever necessary.

Part A

Answer all questions briefly.
Each question carries 4 marks.

1. What are the differences between symbolic and high level languages ?

2. Describe briefly the three tools that a programmer may use to develop a program solution.

3. Write C equivalents for the following :

    (i) $\dfrac{1}{2\,\pi RC\sqrt{6}}.$

    (ii) $\dfrac{ab}{c-d}.$

    (iii) $a^x \log(\sin\theta).$

    (iv) $x + \dfrac{1}{1+\dfrac{1}{1+x}}.$

4. Which of the following are not acceptable as integer constants and why ?

    (i) 0 L.   (ii) 0 8.

    (iii) $0 \times 8\,f.$ (iv) 10,000.

5. For $i = 3, j = 2, k = 1$, what value do the following expressions have ?

    (i) $i >= j >= k.$ (ii) $i >= j \ \&\& \ j >= k.$

6. State how many times will the following "for" loop statements be executed ?

    (i) for $(i = 10 ; i <= 10 ; i++);$

    (ii) for $(i = 10 ; i < 10 ; i++);$

    (iii) for $(i = 10 ; i >= 1 ; i -= 4);$

    (iv) for $(i = 10 ; i == 1 ; i -= 4);$

Turn over

7. Find the number of elements in each of the following arrays :

   (i)   float $f[3][8][2]$;   (ii)   double $d[3][5][4][2]$;

   (iii) char S1 [ ] " ibm " ;   (iv) char S3 [5] = " ibm " ;

8. How do you access the members of a structure ?

9. Why data files are required ? How do you create a data file in C ?

10. What is a pointer ? Mention its advantages.

$$(10 \times 4 = 40 \text{ marks})$$

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 marks.

Module 1

11. Describe the different steps in solving a problem using computer. Illustrate with example.

Or

12. Write an algorithm and draw the flowchart to reverse the given number and check whether it is a palindrome or not.

Module 2

13. Write a program to convert a binary number to its decimal equivalent.

Or

14. (a) What are the different types of data in C ? Explain each with examples alongwith their memory allotment.

                                                                 (8 marks)

   (b) What are unary, binary and ternary operators ? Give examples for each.   **(4 marks)**

Module 3

15. Write a C program to accept a message and count the number of vowels and consonants in it.

Or

16. Using functions, write a C program to find the number of elements that are less than the average in a one-dimensional array.

Module 4

17. Write a C program to accept a message and encode it by adding the value 3 to each character in the input message. Display both the input and encoded message.

Or

18. Write a C program to read the following information of 500 students :

    – student name

    – roll number

    – marks (out of 100)

   The program should print the name and roll number of those students who have obtained more than 60 marks.

Module 5

19. Write a C program to accept an array of elements and find the largest element using pointers.

Or

20. Write a C program to create a data file to store information such as name, age and marital status (married/unmarried) of a person. Display the data of only unmarried persons from the file in another file.

$$(5 \times 12 = 60 \text{ marks})$$